

## APPENDIX I: China's Nuclear Technology Exports In The 1980s And 1990s

COUNTRY	TYPE OF ASSISTANCE
<b>ALGERIA</b>	<ul style="list-style-type: none"> <li>• <b>Research Reactor</b> <ul style="list-style-type: none"> <li>➤ 15 MWt pressurized heavy water research reactor; possible provisions of heavy water for the reactor; construction began around 1988; placed under IAEA safeguards in 1992</li> <li>➤ Designs for construction of third stage of Algeria's Center for Nuclear Energy Research</li> </ul> </li> </ul>
<b>ARGENTINA</b>	<ul style="list-style-type: none"> <li>• <b>Low Enriched Uranium</b> <ul style="list-style-type: none"> <li>➤ 20% enriched, sold in 1980s, no safeguards</li> </ul> </li> <li>• <b>Heavy Water</b> <ul style="list-style-type: none"> <li>➤ 50-60 metric tons (1981-1985); no safeguards</li> </ul> </li> <li>• <b>Uranium Concentrate (U3O8)</b> <ul style="list-style-type: none"> <li>➤ 1981-1985, no safeguards</li> </ul> </li> <li>• <b>Uranium Hexafluoride Gas (UF6)</b> <ul style="list-style-type: none"> <li>➤ Early 1980s, 30 metric tons; no safeguards</li> </ul> </li> </ul>
<b>BRAZIL</b>	<ul style="list-style-type: none"> <li>• <b>Enriched Uranium</b> <ul style="list-style-type: none"> <li>➤ 3%, 7%, 20% enriched; 200 kg total</li> <li>➤ 1984, no safeguards</li> </ul> </li> </ul>
<b>INDIA</b>	<ul style="list-style-type: none"> <li>• <b>Heavy water</b> <ul style="list-style-type: none"> <li>➤ 1982-1987; 130-150 metric tons</li> <li>➤ No IAEA safeguards</li> </ul> </li> <li>• <b>Low-Enriched Uranium</b> <ul style="list-style-type: none"> <li>➤ 1995, for India's Tarapur reactors</li> <li>➤ Supplied under IAEA safeguards</li> </ul> </li> </ul>
<b>IRAN</b>	<ul style="list-style-type: none"> <li>• <b>Research Reactors</b> <ul style="list-style-type: none"> <li>➤ 27kW subcritical, neutron source reactor; provided in 1985; currently under IAEA safeguards</li> <li>➤ Zero-power reactor; commercial contract signed in 1991; currently under IAEA safeguards</li> <li>➤ HT-6B Tokamak nuclear fusion reactor, located at Azan University</li> <li>➤ 20 MWt reactor; contract signed in 1992 but the deal was canceled due to US pressure</li> </ul> </li> <li>• <b>Power Reactors: two 300 MWe reactors</b> <ul style="list-style-type: none"> <li>➤ Deal suspended in 1995 and canceled in 1997</li> <li>➤ CIA verified project cancellation</li> </ul> </li> <li>• <b>Calutrons (electromagnetic isotope separators, EMIS)</b> <ul style="list-style-type: none"> <li>➤ For Karaj and Isfahan facilities; commercial contract signed in 1989; under safeguards</li> </ul> </li> <li>• <b>Uranium Hexafluoride (UF6) Production Facility</b> <ul style="list-style-type: none"> <li>➤ Project canceled in October 1997</li> <li>➤ CIA verified cancellation of deal</li> <li>➤ China possibly provided blueprints for facility</li> </ul> </li> <li>• <b>Zirconium Tube Production Facility</b> <ul style="list-style-type: none"> <li>➤ Assistance continuing</li> </ul> </li> <li>• <b>Uranium Mining Assistance</b></li> </ul>

<i>IRAQ</i>	<ul style="list-style-type: none"> <li>• <b>Ring Magnets</b></li> <li>➤ Exports of samarium-cobalt magnets for gas centrifuges, 1989-1990</li> </ul>
<i>PAKISTAN</i>	<p><b>NUCLEAR WEAPON-RELATED ASSISTANCE</b></p> <ul style="list-style-type: none"> <li>• <b>Nuclear Weapon Design</b></li> <li>➤ Basic, Hiroshima sized weapon</li> <li>• <b>Nuclear Weapon Testing</b></li> <li>➤ Possible inclusion of Pakistani observers at China's Lop Nur test facility (1989)</li> <li>• <b>Possible Provision of Tritium Gas</b></li> <li>➤ 1986, no safeguards</li> <li>• <b>Uranium Enrichment</b></li> <li>➤ Assistance to unsafeguarded Kahuta enrichment facility</li> <li>➤ This assistance was a two-way street</li> <li>• <b>Weapons-Grade Uranium for Two Devices</b></li> <li>➤ Early 1980s, supplied without safeguards</li> </ul> <p><b>DUAL-USE NUCLEAR ASSISTANCE</b></p> <ul style="list-style-type: none"> <li>• <b>Power Reactor: Chashma-1, 300 MWe</b></li> <li>➤ Construction is continuing</li> <li>➤ Under IAEA safeguards (INFCIRC/418)</li> <li>• <b>Reprocessing Facility at Chashma</b></li> <li>➤ Possible construction assistance to unsafeguarded facility</li> <li>• <b>Research Reactors</b></li> <li>➤ Miniature Neutron Source Reactor (MNSR); supplied under IAEA safeguards (INFCIRC/393) in 1991</li> <li>➤ Construction assistance with Parr-2 reactor, unsafeguarded</li> <li>• <b>Ring Magnets</b></li> <li>➤ About 5,000 to unsafeguarded A.Q. Khan Research Laboratory in Kahuta (1995)</li> <li>• <b>Plutonium Production Reactor at Khushab</b></li> <li>➤ 50-70 MW heavy water reactor (unsafeguarded)</li> <li>➤ Construction assistance</li> <li>➤ Provided special industrial furnace and high-tech diagnostic equipment (1994-1995)</li> <li>• <b>Heavy water (D2O)</b></li> <li>➤ Up to 5 MT/year for safeguarded PHWR [Kanupp] research reactor</li> <li>➤ Possibly diverted by Pakistan to the Khushab research reactor against Chinese wishes</li> <li>• <b>Fuel Fabrication Services</b></li> </ul>